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14. ABSTRACT While smoking cessation has received considerable attention within the military, the use of smokeless tobacco (chewing tobacco and snuff) has not been a focus of medical services or research. Epidemiological data suggest that while smoking has continued to decline both in the general population and within the military, the use of smokeless tobacco products has increased. The primary objective of this research was to develop and evaluate an intervention for smokeless tobacco cessation in active-duty military personnel comprised of proactive recruitment, targeted written and video materials mailed to the participant, and phone call support. The study has now been completed. A total of 785 participants enrolled in the study. Mailed follow-up assessments at three and six months post enrollment were completed with 587 three-month surveys and 571 six-month surveys collected. We have reported on the significant outcomes of the study which showed that the brief phone call intervention supplemented with mailed print and video materials significantly increased tobacco cessation among active duty military personnel. The quit rates for participants receiving the active intervention were two to three times greater than for participants who received usual care and this increase in cessation was significant at each follow up point.					
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INTRODUCTION

While smoking cessation has received considerable attention within the military, the use of smokeless tobacco (chewing tobacco and snuff) has not been a focus of medical services or research. Epidemiological data suggest that while smoking has continued to decline both in the general population and within the military, the use of smokeless tobacco products has increased. The primary objective of this research was to develop and evaluate an intervention for smokeless tobacco (ST) cessation comprised of proactive recruitment, targeted written and video materials mailed to the participant, and phone call support. The primary hypothesis to be tested was that participants randomized to receive the intervention would quit their tobacco use at a significantly higher rate than participants receiving usual care. Active duty U.S. Armed Forces personnel stationed at military locations that were identified as current ST users when completing their annual preventive oral health assessment were recruited to participate in a randomized two-group design that compared a brief contact intervention with the usual preventive health care. Follow up assessments were completed at 3- and 6-months by mail or phone to assess the impact of the program.

BODY

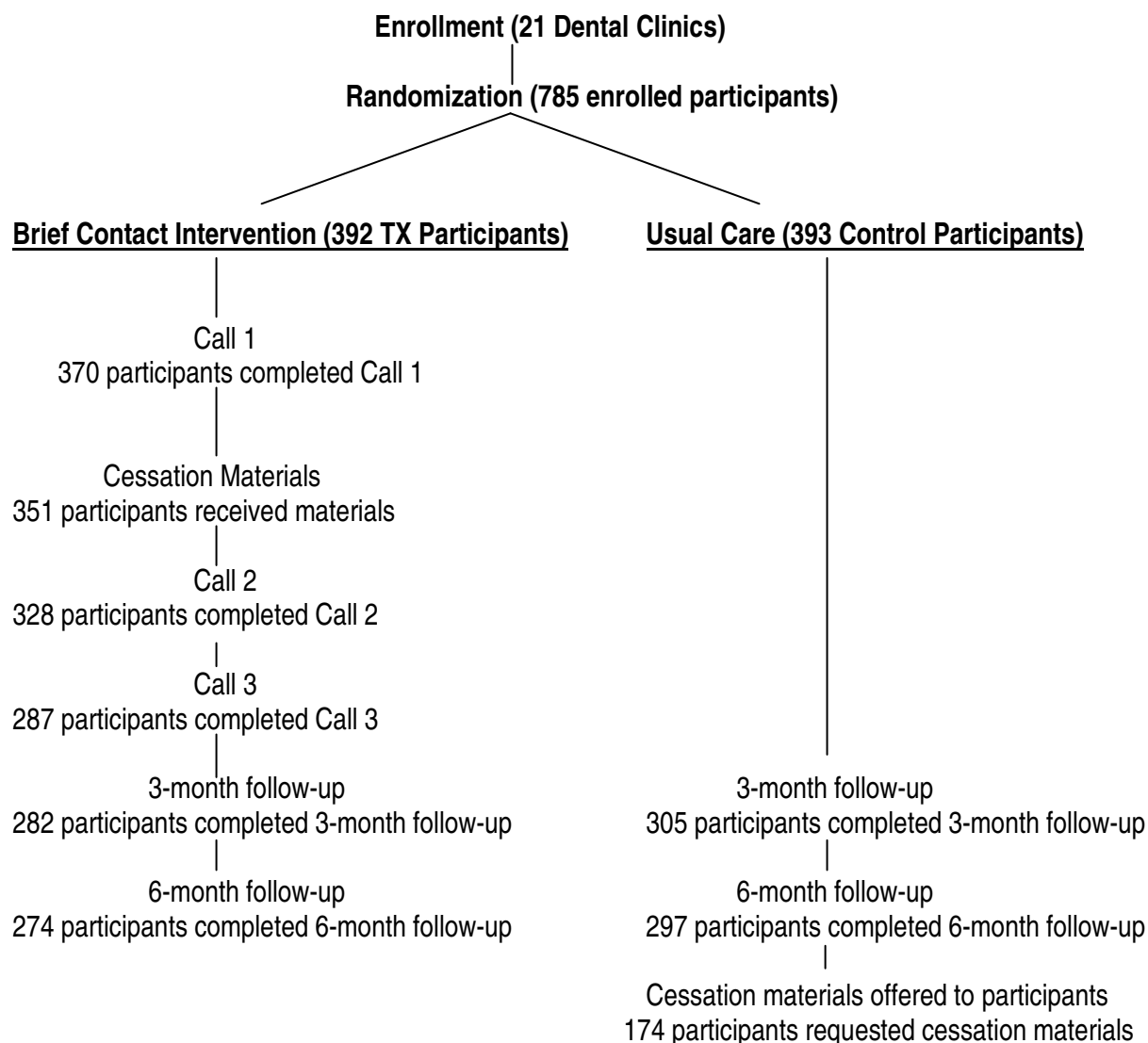
We completed enrollment and follow-up by the fourth year of the study and used a no cost extension to complete follow up assessments and complete data analysis. In total our study recruited participants at 21 military bases as listed in Table 1 below. Across all sites we enrolled 785 participants. 587 participants completed the 3-month follow-up and 571 completed the 6-month follow-up.

Table 1. Recruitment Intervention Sites

	Base	POC	Start Date
Air Force	Lackland AFB, TX (3 clinics)	Lt Col Alan Peterson	09/02/2003
	Randolph AFB, TX	Col Carlos Esquivel	09/08/2003
	Wright Patterson AFB, OH	Lt Col Jeff Cigrang	09/02/2003
	Dyess AFB, TX	Lt Col Randall Griffin	11/17/2003
	Sheppard AFB, TX	Capt Bruce Abe	11/18/2003
	Brooks City Base, TX	Maj Jacob Palma	01/07/2004
	Laughlin AFB, TX	Capt Mark Halverson	01/13/2004
	Robins AFB, GA	Maj Elizabeth Tandy	06/06/2004
	Mt Home AFB, ID	Capt. William Quinn	08/03/2004
	Little Rock AFB, AR	Lt Col Robert Abbott	08/24/2004
	Langley AFB, VA	Col Robert Sabatini	09/01/2004
	Nellis AFB, NV	Lt Col Jeff Thompson	09/28/2004
	Eglin AFB, FL	Col Mike Garrett	11/09/2004
Army	Ft. Sam Houston, TX	COL Ronald Lambert	09/18/2003
	Ft. Sill, OK	LTC Charles Sabadell	07/15/2004
	Ft. Polk, LA	COL Thomas MacKenzie	08/16/2004
	Ft. Leavenworth, KS	LTC Robert Windom	08/03/2004
	Ft. Drum, NY	COL Robert Rock	09/04/2004
	Ft. Knox, KY	COL Stephen Rouse	04/05/2005
Navy	North Island Dental Clinic	CAPT Richard A. Joralmon	06/17/2004
USMC	Camp Pendleton, Clinic 13	CAPT Wayne Osborne	06/18/2005

Of the 785 participants, 392 were assigned to the Treatment Condition (TX). 370 (94%) of the participants assigned to the TX were successfully contacted by phone and offered cessation materials and Motivational Interview (MI) calls, 351 were mailed cessation materials. Figure 1 below illustrates the number of subjects at each stage of the intervention. Six percent of TX participants either asked to be dropped or were unreachable due to lack of contact information, deployment or did not answer their phone or return messages. 282 (72%) of TX participants completed the three follow-up assessment and 274 (70%) completed the six-month follow-up assessment. 17 TX participants actively dropped during MI calls and 20 TX participants refused additional MI calls but were willing to complete follow-up assessments.

Figure 1. DoD Protocol Flowchart



Of the 785 participants 393 were assigned to the Usual Care (UC). The UC condition consisted of the standard practice used at the study sites during the annual dental examination of active duty military personnel. In most cases, this included asking about smokeless tobacco use, advising individuals to quit, and providing a referral to the local tobacco cessation program for those interested in quitting. 305 (78%) of UC participants completed the three follow-up assessment and 297 (76%) completed the six-month follow-up assessment. 174 (59%) of UC

participants who completed the 6-month survey requested to be mailed cessation materials upon completion of their participation (see Figure 1 above).

At the 3-month follow-up 100 participants were either lost due to lack of contact information (39) or deployed (61). We continued to search the military data base as well as other commonly used search methods for participants lost due to lack of contact information. At the 6-month follow-up 110 participants were lost (35) or deployed (75).

47 total participants dropped out of the study during 3- and 6-month follow-up assessments; bringing the total numbers of drops for this study to 64.

Participant Characteristics:

Of the 785 total participants who volunteered for the study, almost all were males (784, 99.9%) and the average age was 30.40 (SD = 7.63). Most of the participants reported that they were married (72.0%) and that they had completed some college or higher (81.9%). The mean Body Mass Index (BMI) was 26.7 (SD = 3.32).

The majority were enlisted members (86.8%) and 13.2% were commissioned officers. The vast majority was enlisted personnel (87%) and the majority of the sample came from the Air Force (66%). About 4% identified themselves as Hispanic or Latino. In terms of race, most participants reported that they were White (696; 89.0%), followed by Black or African American (15; 1.9%), American Indian or Alaska native (12; 1.5 %), Asian (9; 1.1 %), and Native Hawaiian or other Pacific Islander (5; 0.6%). Fifty-two of the participants (6.6%) did not indicate a specific race and three participants reported belonging to more than one race.

Table 2. Demographics of Smokeless Tobacco Users Enrolled in Study

	Mean or Number	Percentage or sd
Age	30.40	7.63
Gender		
Male	784	99.9%
Female	1	0.1%
Married	536	68.3%
Some College or Higher Education	618	78.7%
Ethnicity		
Hispanic or Latino	31	4.0%
Race		
White	699	89.0%
Black/African American	15	1.9%
American Indian	12	1.5%
Asian	9	1.1%
Military Grade		
Enlisted	681	86.8%
Officer	104	13.2%
Branch of Military		
Air Force	515	65.6%
Army	237	30.2%
Marines	24	3.15%
Navy	9	1.15%

Table 3 reports indicators of tobacco dependence and describes the current tobacco use of the sample. The patterns of smokeless tobacco use are shown in Table 3. The average participant started using smokeless tobacco prior to age 18 and their use in years ranged from less than 1 year to 37 years (mean = 12.8 years). Participants reported that they used smokeless tobacco almost every day and consumed about 2 tins or pouches of smokeless tobacco per week. One indication of tobacco dependence is the co-use of cigarettes and smokeless tobacco and 20% of the sample reported concurrently using both tobacco products. The majority of the participants (58.4%) indicated that on average they had their first dip or chew less than one hour after awakening in the morning (< 30 min = 23.9%; 30-60 min = 34.5%; > 60 min = 41.6%). About one-half of participants indicated that they swallowed the tobacco juice at least some of the time (almost always = 12.5%; sometimes = 37.4%; never = 50.1%).

Twenty percent of participants indicated that they also smoked cigarettes, although the majority of these individuals (64%) indicated that they smoked 10 or less cigarettes per day. Twenty-three percent of participants reported that their spouse smoked. In response to the question "How many of your five best friends use smokeless tobacco," 81.7 % indicated that at least one friend also used smokeless tobacco (none = 18.3%; one = 19.2%; two = 22.5%; three = 24.0%; four/five = 16.0 %). Almost half of the participants (45.9%) reported that they had attempted to quit smokeless tobacco use during past year.

Table 3. Characteristics of Smokeless Tobacco Use in Smokeless Tobacco Study Participants

	Mean or Percentage	Standard Deviation
Number of days dip or chew per week	6.21	1.47
Number of days a tin or pouch lasts	3.7	2.16
Number of years of smokeless tobacco use	12.8	8.39
Age of initiation	17.7	5.11
Readiness to quit (0-10 on Contemplation Ladder)	6.43	12.54
Time of first use < 30 minutes after waking	23.9%	N/A
Percentage who swallow spit	49.9%	N/A
Percentage who currently smoke	20.0%	N/A
Percentage who attempted to quit in past year	45.9%	N/A
Percentage of spouse who smokes	23%	
Percentage of closest friends who chew	81.7%	

Recruitment of Intervention Sites

Described below are the Air Force, Army, Navy, and Marine sites that participated in our study. The point of contact (POC) is the person located at the dental clinic who oversaw the project at that site (also see Table 1 above).

Air Force

All of the Air Force sites listed above honored the Wilford Hall Medical Center (WHMC) IRB approval of our protocol, with the exception of Wright-Patterson AFB, OH, Eglin AFB, FL, and Brooks City Base, TX, which have their own IRBs. Our protocol had been previously approved by the Wright-Patterson Medical Center IRB in 2003 and by the Brooks City IRB in January 2004. Our protocol was expeditiously cleared through both the Eglin IRB later in 2004 to allow us to begin recruiting participants there in November 2004.

Army

Four of the participating Army sites are in the Great Plains Medical Region and thus fall under the authority of the BAMC IRB. They were: Ft Sam Houston, TX; Ft Sill, OK; Ft Polk, LA; and Ft Leavenworth, KS. The BAMC IRB approved our protocol for these sites in expeditious fashion, allowing for recruitment to continue (at Ft Sam Houston) and to begin at Ft Sill, Ft Polk, and Ft Leavenworth in the July - August 2004 timeframe. The BAMC IRB allowed us to use the short, 4-page enrollment packet that had been approved for the Air Force by WHMC. As a consequence, enrollment at sites in the Great Plains Medical Region was very good and on a par with AF sites where the shorter enrollment packet was used.

North Atlantic Medical Region Army Sites

The remaining Army sites, Ft Drum, NY, and Ft Knox, KY, are in the North Atlantic Medical Region and thus fall under the authority of the Walter Reed Army Medical Center IRB (WRAMC). The process of gaining IRB approval from WRAMC for enrollment at Ft Drum was quite protracted, lasting at least 12 months. Once the approval was obtained, we were required to use a much longer enrollment packet (i.e., 10 pages long vs. the 4-page enrollment packet approved for AFBs under the WHMC, Wright-Patterson, and Eglin IRBs) and Army sites in the Great Plains Region (BAMC IRB). Initially, we did not realize that we needed to obtain IRB approval from WRAMC to recruit participants at Ft Drum. The AF policy for installations that do not have their own IRB is that a protocol must be reviewed and approved at one of the AF medical center IRBs (e.g., Wilford Hall). To obtain the IRB approval a signed letter must be obtained from the proposed recruitment site installation medical commander authorizing participation in the study and acknowledging that the medical center IRB approval will be accepted because there is not a local IRB. This is the process that we used to obtain IRB approval to recruit participants at 8 AF sites that did not have a local IRB. In reference to Ft Drum, we had received Army IRB approval from both BAMC and Ft Detrick and obtained a signed letter from the Ft Drum medical commander indicating that he would accept the BAMC/Ft Detrick IRB approvals. Using our 4-page enrollment package that had been approved by BAMC and Ft Detrick, we initiated recruitment at Ft Drum and obtained 14 volunteer participants in the first week of recruitment. However, we were then notified that the BAMC/Ft Detrick IRB approvals would not cover Ft Drum and that we needed to stop recruitment and obtain Walter Reed IRB approval. No randomization or treatment had started for any of the initial Ft Drum participants and they were notified that we would need to delay treatment until we obtained WRAMC IRB approval. As mentioned previously, the WRAMC IRB approval took approximately 12 months to obtain and the length of the enrollment package was increased from 4 to 10 pages. We then re-initiated recruitment at Ft Drum and the longer enrollment packet adversely impacted enrollment. Over the subsequent year, we were only able to recruit 5 participants at Ft Drum using this 10-page enrollment package. It should be noted that this was a minimal risk study to help volunteer participants to quit tobacco and no medications were used.

Navy and Marines

The process of gaining IRB approval from the Navy Hospital IRB for enrollment at identified Navy and Marine bases was also quite protracted, lasting 9 months. Again we were required to use a lengthy enrollment packet. Recruitment at these sites was also negatively impacted by the longer enrollment forms. A total of 33 participants were enrolled at these two clinics.

Utilization of Telephone Counseling Guidelines based on Principles of Motivational Interviewing

A crucial part of the intervention in this study is the phone call support given by project phone counselors. We refined, and monitored the quality of telephone counseling calls that incorporated Motivational Interviewing techniques to reinforce participants' own motivation for quitting smokeless tobacco. We provided regular supervision sessions with phone counselors to ensure quality and consistency of counseling calls across counselors and across time.

Utilization of Data Entry/Management System

In this study, data were collected at various points in time at both research sites – Oregon Research Institute (ORI) in Eugene, OR, and Wilford Hall Medical Center (WHMC) in San Antonio, TX. We collected baseline tobacco use data along with consent information from participants at the various dental clinics at the time of participant enrollment. Those data were forwarded by the clinics to ORI for data entry. We collected various data points from participants in the Treatment Group at the time of telephone counseling conducted out of the WHMC research site. We conducted follow-up survey assessments by mail with all participants, in both Treatment and Control Groups, at 3- and 6-months post enrollment and those assessments were both sent and processed at ORI by project staff. If the participant did not respond to requests to complete the mailed survey, we called them to conduct a telephone survey, using the same questions.

In order to centralize and effectively manage the myriad data collected at both sites, we continued in Year-04 to utilize, and in some cases refine, the Electronic Data Management System developed in Year-02. The system was accessible by research staff at WHMC through a virtual private network (VPN) that completely protected participant confidentiality and allowed WHMC research staff in Texas to accomplish data entry and updates as needed. In addition to being a repository for collected data, the system also served as a scheduling function. It scheduled the dates for the three counseling calls to TX participants, as well as dates for follow-up assessments. The evolving database provided the basis for all data analysis procedures to be conducted at the conclusion of the data collection phase.

The database development, expansion, and shared input by staff at WHMC and ORI were key activities in the project. The data entry was all done at ORI where the enrollment data and all follow-up data are stored in secure files by participant number. All MI phone contacts were done by phone counselors and the information they collected was input into the database for that participant. The Virtual Private Network connection, which was developed and implemented in Year-02, allowed the phone counselor to enter key data for the participant into the database. The counselor also accessed the database prior to the call to determine the degree of the participant's readiness to quit, amount of smokeless tobacco used, and other relevant information to use in their motivational interview phone calls. This same system was used in the scheduling and tracking of follow-up assessments at 3- and 6-months.

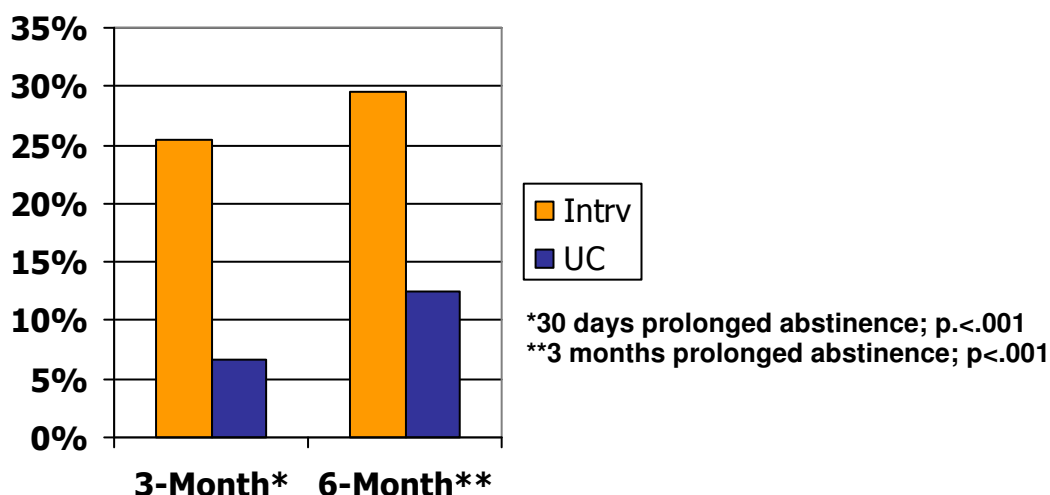
KEY RESEARCH ACCOMPLISHMENTS

The primary key research accomplishment was the development of a military-tailored smokeless tobacco cessation program that was demonstrated to be effective for smokeless tobacco cessation in active-duty military personnel. In addition, we developed a military-tailored smokeless tobacco cessation guide (Severson & Gordon, 2007). The results of this PRMRP-funded study have important scientific and clinical significance and have provided strong support for the need to expand on these research findings. Additional research should determine the best method for dissemination of this treatment program to medical and dental treatment facilities throughout the Department of Defense.

REPORTABLE OUTCOMES

The 3- and 6-month follow-up data are very promising and we obtained very large effect sizes. At the 3-month follow-up, our ST Cessation Program resulted in a 47% quit rate (7-day point prevalence for all respondents) as compared to only 14% with usual care ($p < .001$). Using an intent-to-treat analysis in which non-respondents are assumed to have not quit, the cessation rate was still three times higher in the active intervention group (33% versus 11%; $p < .001$). The quit rates were slightly decreased at the 6-month follow-up, but were still very robust with the active intervention group being twice as likely to have quit (45% versus 22% for all respondents ($p < .001$); 30% versus 15% using an intent to treat analysis ($p < .001$)). While these point prevalence data are very impressive we also computed more conservative analysis of the data using prolonged abstinence measures. As shown on Figure 2 below, these analysis also show significant increases in tobacco abstinence for participants receiving the active intervention. Participants in the TX condition reported a 3 month prolonged abstinence of 20.4% vs. 9.2% in Usual Care. The 6 month prolonged abstinence rates were 13.5% for TX and 5.6% for UC. These results are illustrated in Figure 2 below.

Figure 2. Comparison of Quit Rates



CONCLUSIONS

These results provide strong support for the efficacy of a ST cessation program for active duty military personnel. However, the use of trained phone counselors--which we believe was a key factor in the success of our program--makes the dissemination of this type of program a bit complicated and costly. It may be that similar results could be obtained if this program was implemented without the phone counselor component and if it included only the Enough Snuff Cessation Guide and the Tough Enough to Quit DVD. This abbreviated intervention (Book + DVD) could also be strengthened by using a population health approach where all ST users are identified during the annual dental exam and then offered a brief intervention in the dental clinic. The potential population health impact might be even greater if we were to provide training to the dental staff in the use of brief (i.e., < 5 minutes) motivational interviewing and motivational enhancement strategies that could be incorporated into their annual exam. The military healthcare setting is one of the few settings where a true population health intervention study could be successfully employed and evaluated. We plan to seek additional funding from the PRMRP or the National Cancer Institute to conduct a follow-on study to evaluate brief versus enhanced versions of our smokeless tobacco cessation program and to determine the best method for

dissemination of the program(s) throughout the DoD dental community. We have completed the review of the data from the study and we are focused on writing the reports of the study outcomes. We have one paper that is under review in which we report the baseline data and characteristics of the sample for the study. We are now completing the analysis of the study results and have drafted the article describing the primary and secondary outcomes of the study.

REFERENCES

Severson, H.H. & Gordon, J.S. (2007). Enough snuff quitting smokeless tobacco: A guide for military personnel. Eugene, OR: Applied Behavior Science Press) and a videotape/DVD (Severson, H.H., Gordon, J.S., & Christiansen, S. (2003). Tough enough to quit (DVD). Eugene, OR: Applied Behavior Science Press

BIBLIOGRAPHY

Presentations

Severson, H.H. (2004, March). Effective ways to promote smokeless tobacco cessation. Presentation to the 43rd Navy Occupational Health & Preventive Medicine Workshop in Chesapeake, VA.

Severson, H.H., Peterson, A.L., Gordon, G.S., Andrews, J.A., Cigrang, J., Hunter, C.M., & Gott, S.P. (2004, April). Population health trial for smokeless tobacco cessation with military personnel. Poster presented at the Peer Reviewed Medical Research Program Investigators Meeting (PRMRP) in San Juan, Puerto Rico.

Cigrang, J.A., Peterson, A.L., Severson, H.H., Gott, S., & Andrews, J.A. (2006, March). Smokeless Tobacco Cessation with Military Personnel Using Motivational Interview Phone Support. Presented at the Society for Behavioral Medicine in San Francisco, CA.

Severson, H.H., Gordon, J.S., Cigrang, J.A., Peterson, A.L. & Andrews, J.A. (2006, February) Evaluating motivational interview phone support for smokeless tobacco cessation with military personnel. Paper presented at the 12th Annual Meeting of the Society for Research on Nicotine and Tobacco in Orlando, FL.

Cigrang, J.A., Peterson, A.L., Severson, H.H., Gott, S.P., Andrews, J.A. (2006, March). Smokeless tobacco cessation with military personnel using motivational interview phone support. Poster presented at the 27th Annual Meeting for the Society of Behavioral Medicine in San Francisco, CA.

Severson, H.H., Peterson, A.L., Cigrang, J.A., Gott, S., Andrews, J.A., & Gordon, G.S., (2006, April). Population health trial for smokeless tobacco cessation with military personnel. Poster presented at the Peer Reviewed Medical Research Program Military Health Research Forum (PRMRP) in San Juan, Puerto Rico.

Severson, H.H., Andrews, J.A., Peterson, A.L., Gordon, J.S., & Cigrang, J.A. (2006, December). Motivational interview phone support: An efficacious method for smokeless tobacco cessation. Presented at the 9th International Congress for Behavioral Medicine, Bangkok, Thailand.

Papers

Published

Cigrang, J.A., Severson, H.H., & Peterson, A.L. (2002). Pilot evaluation of a population-based health intervention for reducing use of smokeless tobacco. *Nicotine & Tobacco Research* 4(1), 127-131.

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APPENDICES

Peterson, A.L., Severson, H.H., Andrews, J.A., Gott, S.P., Cigrang, J.A., Gordon, J.S., Hunter, C.M., & Martin, G.C. (under review). Smokeless tobacco use in military personnel.

Smokeless Tobacco Use in Military Personnel

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Abstract

Military personnel are more than twice as likely as civilians to use smokeless tobacco (ST) and recent studies indicate that military prevalence rates are rising. However, few studies have examined factors related to ST use in the military. The present study evaluated the characteristics of ST use in 785 active-duty military personnel. The results indicated that the average age of initiation was 17.7 years, participants had used ST for 12.3 years, and they used about 4 tins or pouches of tobacco per week. Army personnel were more likely than Air Force to be older, to have used ST longer, and to be heavier users. Officers had used ST longer than enlisted personnel and were more likely to have had a recent quit attempt. Enlisted personnel were more than three times as likely to report concurrent cigarette smoking. These results indicate that there are significant differences in ST use patterns in military personnel and cessation programs should be tailored to meet these differences.

Smokeless Tobacco Use in Military Personnel

Smokeless tobacco (ST) use has been shown to be related to a number of increased health risks including, but not limited to, oral cancer,¹⁻⁴ pancreatic cancer,⁵⁻⁶ and cardiovascular disease.⁷⁻¹⁰ However, despite the significant health risks of ST use, it has received far less scientific attention than cigarette smoking. A publication citation search conducted through the National Library of Medicine's Entrez PubMed database for the past 5 years (2001 to 2006) identified 35,330 citations for smoking, as compared to only 488 for ST.¹¹ The reasons for this lack of scientific emphasis on ST are not known. One explanation may be the lower prevalence of using snuff or chewing tobacco, which has been reported to be 4-10 times lower than for smoking.¹² Another reason may be the perception of decreased health risks associated with ST as compared to smoking.⁶⁻⁸

The lack of scientific research on smokeless tobacco has resulted in a limited knowledge base on factors related to ST use, especially for high-risk or vulnerable populations. One such high-risk population for ST use is military personnel. Historically, the U.S. military has been an environment in which tobacco use was accepted and sometimes even encouraged.¹³⁻¹⁵ In 1980, just over half (51%) of all U.S. military personnel smoked.¹⁴ However, over the past two decades the Department of Defense¹⁶⁻¹⁷ has taken strong steps to reduce tobacco use in U.S. military personnel. The DoD now bans smoking in all public buildings and all branches of the U.S. military prohibit tobacco use of any kind during basic military training.¹⁷ Tobacco cessation programs are available at every major military

medical facility including many deployed locations in Iraq and Afghanistan. As a result, by 2005 smoking among U.S. military personnel had been reduced to 32.2%.¹⁸

Unfortunately, similar reductions have not occurred in the use of smokeless tobacco. Recent data from the DoD Survey of Health Related Behaviors Among Military Personnel¹⁸ indicated that ST use over the past 30 days for all military personnel has increased by 24% between 1998 (11.7%) and 2005 (14.5%). Among males from all of the services, the ST use rate increased from 13.4% in 1998 to 16.8% in 2005.¹⁸ Young males aged 18-24 are the group mostly likely to use ST, and Bray's survey indicated that military males in this age range reported a 26% increase in ST use between 2002 (17.1%) and 2005 (21.6%). However, the single greatest increase in ST use has been in older males. Among military males aged 35 and over, ST use increased by 90% between 1998 and 2002 (from 5.3% to 10.1%). All of these increases in ST use rates were fairly consistent across all branches of military service.

Within the military, there are significant differences in ST use between the different service branches, with Marine and Army personnel being the highest utilizers. During 2005, over one-fourth of 18-24 year old Marines (27.4%) reported ST use over the past 30 days as compared to 25.6% for the Army, 16.8% in the Navy, and 14.3% in the Air Force. It is not known what factors may contribute to the differences in ST use found in these different groups of U.S. military personnel.¹⁸

Smokeless tobacco use is higher across all branches of the military as compared to civilian populations. According to the 2004 National Survey on Drug Use and Health,¹⁹ the prevalence of ST in the past 30 days for civilian males between the ages of 18 and 25 was 9.5% as compared to 17.1% in the U.S. military.¹⁸ These results suggest that military

personnel are a high-risk group and are almost twice as likely to use moist snuff or chewing tobacco than civilians of the same age. However, there have been few studies examining factors related to ST use in the military.

Several previous studies investigated ST use in military populations. Bray and colleagues^{14, 18, 20-21} have conducted repeated cross-sectional surveys of ST use in military personnel as part of the DoD Survey of Health Related Behaviors Among Military Personnel. However, Bray's research has focused on the prevalence of ST and not examined the factors related to ST use. Most other studies included small samples ($N \leq 60$)²²⁻²³ or basic military trainees upon initial entry into the military.²³⁻²⁷ As such, none of these studies included a comprehensive evaluation of patterns of ST use and factors related to ST use in a large sample of active-duty military personnel from more than one branch of military service.

The present study evaluated smokeless tobacco use in a large sample ($N = 785$) of active-duty U.S. military personnel. To the best of our knowledge, this is the largest comprehensive assessment of ST use in military personnel that has been conducted to date. We provide data on demographics of military ST users, differences between Army and Air Force ST users, and differences between officers and enlisted personnel. Assessments were designed to elucidate factors related to ST use in this high-risk population including patterns of use (frequency, dependence, history of quit attempts, etc.), psychosocial influences (spouse, friends, depression, etc.), and the relationship of ST with other behavioral risk factors (alcohol, cigarettes, weight). A better understanding of the factors related to ST use in high risk/high use populations will help in the planning for targeted prevention and cessation programs.

Methods

Design and Procedures

This study was a collaborative effort among investigators at Wilford Hall Medical Center (Lackland Air Force Base, San Antonio, TX), the Oregon Research Institute (Eugene, OR), and Wright-Patterson Medical Center (Dayton, OH) and funded by the Department of Defense Peer Review Medical Research Program (grant # DAMD17-02-2-0017; Severson). Active-duty military participants were recruited during their annual dental examination. Each of the military services includes assessment of tobacco use as a routine part of the annual dental screening because of the known positive correlation between tobacco use, dental disease, and overall health²⁸⁻³⁰ and dental pain.³¹ The data in the present paper are part of the baseline assessment for a randomized clinical trial of smokeless tobacco cessation in military personnel.

Participants

The participants were 785 active-duty U.S. military personnel who reported current use of smokeless tobacco. The distribution of participants across branch of military service is included in Table 1. A total of 20 military installations agreed to serve as recruitment sites. These military installations were located across the continental U.S. and included 28 different military dental clinics. Participants included individuals from the Air Force (n = 515), Army (n = 237), Navy (n = 9), and Marines (n = 24). The participation rates for each of the services were inversely proportional to the time required to obtain Institutional Review Board (IRB) approval at each of the sites. Additionally, the initiation of the study was just prior to the start of Operation Iraqi Freedom (OIF) and some sites were hesitant to agree to participate because of heavy deployment taskings which included additional dental screenings.

Measures

Data were obtained using a baseline questionnaire at the time of enrollment at the dental clinic. The 23-item baseline questionnaire surveyed a variety of behavioral risk factors covering three general domains including demographics, tobacco use history (both smokeless tobacco and cigarettes), and potential risk factors for tobacco use. In terms of demographics, participants were asked to provide their age, gender, military rank, height, weight, marital status, educational attainment, race, and ethnicity.

History of tobacco use was assessed by 10 items including, number of days per week ST is used, number of days a can or pouch lasted, time before the first dip or chew of the day, age of first ST use, whether or not they swallowed the tobacco juice (never, sometimes, almost always), and ST quit attempts during the past 12 months. Participants were asked whether they also smoked cigarettes, including number of cigarettes smoked on a typical day for those who responded positively. They were also asked whether their spouse/partner smoked and their readiness to quit ST using a modification of the contemplation ladder³² (11 point scale, 0 = Not ready to quit, 2 = Should consider quitting someday, 4 = Should quit but not quite ready, 6 = Thinking about cutting down or quitting, 8 = Have cut down and seriously considering quitting, 10 = Ready to quit now). Potential risk factors for ST use were also assessed, including current and past mental health status (two or more years in life when they felt depressed; in past year, two or more weeks feeling sad, blue, or depressed) and alcohol consumption during the past 7 days, and number of five best friends who currently use ST.

Results

Of the 785 total participants who volunteered for the study, almost all were males (784, 99.9%) and the average age was 30.40 (SD = 7.63). Most of the participants reported that they were married (72.0%) and that they had completed some college or higher (81.9%). The mean Body Mass Index (BMI) was 26.7 (3.32).

The majority were enlisted members (86.8%) and 13.2% were commissioned officers. About 4% identified themselves as Hispanic or Latino. In terms of race, most participants reported that they were White (696; 89.0%), followed by Black or African American (15; 1.9%), American Indian or Alaska native (12; 1.5 %), Asian (9; 1.1 %), and Native Hawaiian or other Pacific Islander (5; 0.6%). Fifty-two of the participants (6.6%) did not indicate a specific race and three participants reported belonging to more than one race.

The patterns of smokeless tobacco use are shown in Table 3. The average participant started using smokeless tobacco prior to age 18 and their use in years ranged from less than 1 year to 37 years (mean = 12.8 years). Participants reported that they used smokeless tobacco almost every day and consumed about 2 tins or pouches of smokeless tobacco per week. The majority of the participants (58.4%) indicated that on average they had their first dip or chew less than one hour after awakening in the morning (< 30 min = 23.9%; 30-60 min = 34.5%; > 60 min = 41.6%). About one-half of participants indicated that they swallowed the tobacco juice on at least sometimes (almost always = 12.5%; sometimes = 37.4%; never = 50.1%).

Twenty percent of participants indicated that they also smoked cigarettes, although the majority of these individuals (64%) indicated that they smoked 10 or less cigarettes per day. Twenty-three percent of participants reported that their spouse smoked. In response to the question "How many of your five best friends use smokeless tobacco," 81.7 % indicated that at least one friend also used smokeless tobacco (none = 18.3%; one = 19.2%; two =

22.5%; three = 24.0%; four/five = 16.0 %). Almost half of the participants (45.9%) reported that they had attempted to quit smokeless tobacco use during past year.

In terms of self-reported symptoms of depression, about 1 in 5 participants (17.8%) indicated that in the past year they had two weeks or more in which they had felt sad, blue, or depressed, or when they had lost all interest or pleasure in things that they usually cared about or enjoyed. About 1 in 8 participants (12.4%) indicated that they had two or more years in their life when they had felt depressed or sad on most days.

Over half of the participants (59.8%) reported that they had consumed alcohol during the past week. In terms of number of alcoholic beverages consumed, 39.6% reported that they had consumed 1-6 drinks and 20.2% indicated consumption of more than 6 beverages. The mean number of drinks per week was 3.71 (sd = 5.10).

Comparison of Air Force and Army ST Users. A comparison of Air Force (n = 510) and Army (n = 232) participants on demographics and ST use is included in Table 4. Army personnel were significantly more likely to be older (33 vs. 30 years old; $t(723) = 4.60$, $p < .001$) and to have used ST for a longer period of time (14 vs. 12 years; $t(717) = 3.14$, $p < .01$). Most measures indicated that Army personnel were heavier users of tobacco and may have been more addicted to nicotine. Although there were no significant differences in the frequency of ST use as measured by number of days used per week (6.24 vs. 6.20 days), Army participants used more ST based on how long a tin or pouch of ST lasted. Similarly, more Army participants used ST within the first 30 minutes after waking (32% vs. 21%). The percentage of participants who reported that they at least sometimes swallowed their tobacco juice spit (54% vs. 49%) and smoked cigarettes (24% vs. 19%) was higher in the Army sample, but these differences did not reach statistical significance.

Comparison of ST Use in Officers and Enlisted Personnel. The data were also analyzed to compare commissioned officers (n = 104; 13%) to enlisted members (n = 681; 87%) and the results are included in Table 5. Commissioned officers, who are required to have completed a college degree prior to commissioning, were significantly older, more likely to be married, and to have completed at least a bachelor's degree. Officers were significantly older when they first started to use smokeless tobacco and they had used smokeless tobacco for a longer period of time. Enlisted personnel were more than three times as likely to also smoke cigarettes (23% vs. 7%).

In terms of smokeless tobacco use patterns, officers and enlisted personnel were very similar. There were no significant differences in number of days per week that ST was used, how long a tin or pouch lasted, how soon after waking they used ST, or the percentage that at least occasionally swallowed their tobacco juice spit. Officers were significantly more likely to have attempted to quit ST use during the past year (57% vs. 44%) and they also rated themselves as being significantly more ready to quit.

Discussion

This study is the largest and first of its kind to comprehensively evaluate patterns of ST use in U.S. military personnel. The data were collected on use patterns of 785 active-duty military personnel in the relatively low-threat setting of dental clinics as part of the annual exam. Due to ST's clear relationship to oral health, the dental clinic setting was a particularly opportune location to assess for smokeless tobacco use.

The demographics of the military participants in this study were similar to the demographics reported in most civilian studies. The mean age in the present study was 30.4 years, which compares favorably to the participants in one civilian study where the average

age of the 402 participants was 30.8 years.³³ However, participants in the present study were younger than those in two other dental office based intervention studies by Severson and colleagues³⁴⁻³⁵ in which the mean ages of participants were 36.9 and 38.5 years, respectively.

Although most of the participants in the present study were white males, this is similar to reports in civilian populations³³⁻³⁵ and is an accurate reflection of the population most likely to consume ST. Similarly, 72% of the participants in the present study reported being married or living with a partner, which was similar to the large majority of participants in other studies. Regarding level of education, 82% of the military participants in this study reported some college or higher, which is somewhat higher than in a previous civilian study³⁵ where 69% reported some post-high school education. This difference might be attributable to the educational opportunities and tuition assistance available to active-duty military. The ratio of enlisted to officer participants in this sample (enlisted = 87.8%; officers = 13.2%) is similar to the average composition of the DoD as a whole (enlisted = 85.5%; officers = 14.5%).³⁶

The two largest groups of participants in our study were members of the Air Force (n = 515) and the Army (n = 237) and the differences found between these military branches were quite interesting. Army participants were more likely to: (1) be older, (2) have used ST for a longer period of time, (3) be heavier users of ST, and (4) report use patterns consistent with higher levels of addiction to nicotine. Although it is not uncommon to hear anecdotal and lay descriptions of the differences between Air Force and Army personnel, the specific factors that may have contributed to the differences in ST use found in this study are not known.

We also analyzed differences in ST use patterns in officers and enlisted personnel and overall the patterns of use were quite similar in terms of current use patterns. However, officers were more likely to (1) have completed a college degree, (2) be older, (3) be married, (4) have been older when they initiated ST use, (5) have used ST for a longer period of time, (6) report being ready to quit, and (7) indicate that they had attempted to quit at some point in the past year. The most dramatic difference between ST use patterns in enlisted personnel and officers was related to the co-occurrence of smoking. Enlisted personnel were more than three times as likely as officers to also smoke cigarettes. Previous studies with civilian personnel have found a negative correlation between education levels and rate of smoking.³⁷⁻

³⁹ This is consistent with the inverse relationship of ST use and education found in adult civilian populations of ST users as well.⁴⁰ The data collected in the present study does not allow us to explain why these differences were found. We do, however, have three hypotheses that may explain these differences. First, it may be that military ST users do not believe there are significant health risks associated with ST use as compared to the risks of smoking. Another hypothesis is related to the potential for secretive use of ST by officers who are often looked upon as role models for enlisted personnel. Whereas smoking tends to be a more publicly observable behavior, ST use can be much more easily concealed. Finally, some ST users may believe that any health risk symptoms of ST, such as oral leukoplakia, will quickly resolve after quitting.⁴¹

Another interesting finding is that almost half of all of the participants reported that they had attempted to quit smokeless tobacco use during past year. This is consistent with previous military reports by Bray and colleagues^{14, 18, 20-21} that indicate that most individuals who attempt to quit are not successful and very few participate in formal, evidence-based

cessation programs. There are many barriers to participation in such programs by military personnel including duty requirements, times when such programs are offered, and the requirement to attend multiple appointments in many programs. The results of the present study suggest that a large percentage of military personnel are interested quitting ST if programs were easier to access and use and were designed to meet their specific cessation needs. This find is important considering that despite this reported interest in quitting, there has been a significant increase in ST use over the past several years.

Several limitations of the present study should be noted. First, the data were obtained through self-report measures and no biological verification measures were obtained. The study would also have been strengthened by the inclusion of a larger number of Navy and Marine personnel. About two-thirds of the participants were Air Force personnel. The reduced participation by the other branches of the military was related to significant delays in obtaining Institutional Review Board (IRB) approval. Air Force IRB approval was obtained in about three months, whereas the other service IRBs took up to one year or longer to approve the protocol. Although data at Air Force sites were collected at dental clinics at 15 different locations, the Air Force allowed one IRB to serve as the primary IRB of record and did not require full IRB review for most other Air Force recruitment sites. The delays at other sites were related to the requirement for multiple IRB reviews within the same service branches, significant differences in IRB protocol requirements, and differences in the requirements for informed consent documents.

The results of the present study have implication for military tobacco cessation programs and policy. First, these results suggest that tobacco cessation programs for military personnel should be flexibly tailored to meet the needs of the particular target group. For

example, the significant co-occurrence of smoking in enlisted personnel should be addressed if the overall goal is complete tobacco cessation. Army personnel, who tended to be more addicted to nicotine, might benefit from the addition of nicotine replacement therapy as part of the tobacco cessation program.

The results of the present study may also have implications for military tobacco use policy, especially considering the report of a recent significant increase in tobacco use in the military.¹⁸ Specific factors related to the recent increase in ST use in military are not known. One hypothesis is that this increase may be related to increased stress in the military related to frequent deployments in support of Operation Enduring Freedom and Operation Iraqi Freedom. Another hypothesis is the significant increase in advertising of smokeless products specifically targeting military personnel.⁴² Also lit cigarettes are illuminated targets for enemy combatants in deployed settings, which may prompt individuals to use ST.

Recent military policies have also targeted limitations on all forms of tobacco use at the work place.¹⁷ Although this policy is fairly easy to implement and enforce for smoking, it is not the case for smokeless tobacco. It may be that some individuals have switched to ST use, either totally or partially, as a way to get around this policy. For example, some individuals might prefer to smoke cigarettes and may only use ST when in public settings where smoking is prohibited. This may at least partially account for the large co-occurrence in smoking and ST use we found in enlisted personnel in the present study. Similarly, it may be that ST use is more common in the deployed setting where there are even greater limitations on smoking behavior.

In summary, the results of the present study suggest that military personnel are a high-risk population for smokeless tobacco use and there may be unique factors that

contribute to patterns of use that differ between branches of the military as well as between officer and enlisted personnel. Additional research is needed to examine ST use patterns in Navy and Marine populations. More importantly, the results of this study provide important information to be incorporated into tailored ST cessation programs for military personnel.

References

1. Mattson ME, Winn DM. Smokeless tobacco: association with increased cancer risk. *NCI Monogr.* 1989;8:13-6.
2. Rodu B, Jansson C. Smokeless tobacco and oral cancer: a review of the risks and determinants. *Crit Rev Oral Biol Med.* 2004;15:252-63.
3. Warnakulasuriya S. Smokeless tobacco and oral cancer. *Oral Dis.* 2004; 10: 1-4.
- Zhu BP, Giovino GA, Mowery PD, Eriksen MP. The relationship between cigarette smoking and education revisited: implications for categorizing persons' educational status. *Am J Public Health.* 1996;86:1582-89.
4. Walsh PM, Epstein JB. The oral effects of smokeless tobacco. *J Can Dent Assoc.* 2000;66:22-5.
5. Alguacil J, Silverman DT. Smokeless and other noncigarette tobacco use and pancreatic cancer: a case-control study based on direct interviews. *Cancer Epidemiol Biomarkers Prev.* 2004;13:55-8.
6. Boffetta P, Aagnes B, Weiderpass E, & Andersen A. Smokeless tobacco use and risk of cancer of the pancreas and other organs. *Int J Cancer.* 2005;114:992-95.
7. Critchley JA, Unal B. Is smokeless tobacco a risk factor for coronary heart disease? A systematic review of epidemiological studies. *Eur J Cardiovasc Prev Rehabil.* 2004;11:101-12.

8. Henley SJ, Thun MJ, Connell C, Calle EE. Two large prospective studies of mortality among men who use snuff or chewing tobacco (United States). *Cancer Causes Control*. 2005;16:347-358.
9. Benowitz NL, Porchet H, Sheiner L, Jacob P III. Nicotine absorption and cardiovascular effects with smokeless tobacco use: comparison with cigarettes and nicotine gum. *Clin Pharmacol Ther*. 1998; 44:23-8.
10. Bolinder G, Alfredsson L, Englund A, de Faire U. Smokeless tobacco use and increased cardiovascular mortality among Swedish construction workers. *Am J Public Health*. 1994; 84:399-404.
11. National Library of Medicine. Entrez PubMed database; 2006 [cited 2007 Mar 13]. Available from: www.pubmed.gov.
12. Mumford EA, Levy DT, Gitchell JG, Blackman KO. Smokeless tobacco use 1992-2002: Trends and measurement in the Current Population Survey-Tobacco Use Supplements. *Tob Control*. 2006;15:166-71.
13. Blake GH. Smoking and the military. *N Y State J Med*. 1985;85:354-56.
14. Bray RM, Hourani LL, Rae KL, Dever JA, Brown J M, Vincus AA, Pemberton MR, Marsden ME, Faulkner DL, Vandermaas-Peeler R. 2002 Department of Defense Survey of Health Related Behaviors among Military Personnel. Research Triangle Institute; 2003 [cited 2007 Mar 13] Available from: www.tricare.osd.mil
15. Conway TL. Tobacco use and the United States military: A longstanding problem. *Tobacco Control*. 1998; 7: 219-221.

16. Department of Defense. DoD Directive 1010.10, Health Promotion; 1986 Mar 11 [cited 2007 Mar 13]. Available from:

http://www.dtic.mil/whs/directives/corres/pdf/101010_082203/101010p.pdf
17. Department of Defense. DoD Instruction 1010.15, Smoke-Free Workplace; 2001 Jan 2 [cited 2007 Mar 13]. Available from:

http://www.dtic.mil/whs/directives/corres/pdf/i101015_010201/i101015p.pdf
18. Bray RM, Hourani LL, Rae Olmsted KL, Witt M, Brown JM, Pemberton MR, Marsden ME, Marriott B, Scheffler S, Vandermaas-Peeler R, Weimer B, Calvin S, Bradshaw M, Close K, Hayden D. 2005 Department of Defense Survey of Health Related Behaviors among Active Duty Military Personnel. Research Triangle Institute; 2006. Report No.: RTI/7841/106-FR. Available from <http://dodwws.rti.org/>
19. USDHHS. Results from the 2004 National Survey on Drug Use and Health. U. S. Department of Health and Human Services; 2005 [cited 2006 Feb 10]

Available from:

<http://store.health.org/catalog/productDetails.aspx?ProductID=17202>.
20. Bray RM, Kroutil LA, Wheelless SC, Marsden ME, Bailey SL, Fairback JA, Harford TC. 1995 Department of Defense Survey of Health Related Behaviors among Military Personnel. Research Triangle Institute; 1996. Report No.: RTI/7034/006-FR.
21. Bray RM, Sanchez RP, Ornstein ML, Lentine D, Vincus AA, Baird TU, Walker JA, Wheelless SC, Guess LL, Kroutil LA, Iannacchione VG. 1998 Department

of Defense Survey of Health Related Behaviors among Military Personnel.
Research Triangle Institute; 1999. Report No.: RTI/7034/006-FR.

22. Grasser JA, Childers E. Prevalence of smokeless tobacco use and clinical oral leukoplakia in a military population. *Mil Med.* 1997;162:401-4.
23. Kenny KK, Quigley NC, Regennitter FJ. Survey of smokeless tobacco use in basic trainees and armor basic course officers. *Mil Med.* 1996;161:37-42.
24. Ebbert JO, Haddock CK, Vander Weg M, Klesges RC, Poston WS, DeBon M. Predictors of smokeless tobacco initiation in a young adult military cohort. *Am J Health Behav.* 2006;30:103-12.
25. Haddock CK, Vander Weg M, DeBon M, Klesges RC, Talcott GW, Lando H Peterson AL. Evidence that smokeless tobacco is a gateway drug for smoking initiation in young adult males. *Prev Med.* 2001;32:262-67.
26. Lando HA, Haddock CK, Klesges RC, Talcott GW, Jensen J. Smokeless tobacco use in a population of young adults. *Addict Behav.* 1999;24:431-37.
27. Vander Weg MW, DeBon M, Peterson AL, Sherrill-Mittleman D, Klesges RC, Relyea GE. Prevalence and correlates of lifetime smokeless tobacco use in female military recruits. *Nicotine Tob Res.* 2005;7:431-41.
28. Andrews JA, Severson HH, Lichtenstein E, & Gordon J S. Relationship between tobacco use and self-reported oral hygiene habits. *J Am Dent Assoc.* 1998;129:313-20.
29. Machuca G, Rosales I, Lacalle JR, Machuca C, Bullon P. Effect of cigarette smoking on periodontal status of healthy young adults. *J Periodontol.* 2000;71:73-88.

30. Molloy J, Wolff LF, Lopez-Guzman A, Hodges JS. The association of periodontal disease parameters with systemic medical conditions and tobacco use. *J Clin Periodontol.* 2004;31:625-32.
31. Riley JL III, Tomar SL, Gilbert GH. Smoking and smokeless tobacco: increased risk for oral pain. *J Pain.* 2004;5:218-25.
32. Biener L, Abrams DB. The contemplation ladder: Validation of a measure of readiness to consider smoking cessation. *Health Psychol.* 1978;10:306–65.
33. Hatsukami DK, Jensen J, Boyle R, Grillo M, Bliss R. Characteristics of smokeless tobacco users seeking treatment. *Addict Behav.* 1999;24:551-7.
34. Andrews JA, Severson HH, Akers L, Lichtenstein E, Barckley M. Who enrolls in a self-help cessation program for smokeless tobacco? *Addict Behav.* 2001;5:757-64.
35. Severson HH, Andrews JA, Lichtenstein E, Gordon JS, Barckley M, Akers L. A self-help cessation program for smokeless tobacco users: comparison of two interventions. *Nicotine Tob Res.* 2000;2:363-70.
36. Statistical Analysis Information Division. DoD Personnel & Procurement Statistics: Personnel & Procurement Reports and Data Files; 2006[cited 2006 May 17]. Available from: <http://siadapp.dior.whs.mil/index.html>.
37. Kubicka L, Matejcek Z, Dytrych Z, Roth Z. IQ and personality traits assessed in childhood as predictors of drinking and smoking behaviour in middle-aged adults: A 24-year follow-up study. *Addiction.* 2001;96:1615-28.
38. Whalley LJ, Fox HC, Deary IJ, Starr JM. Childhood IQ, smoking, and cognitive change from age 11 to 64 years. *Addict Behav.* 2005; 30: 77-88.

39. Zhu BP, Giovino GA, Mowery PD, Eriksen MP. The relationship between cigarette smoking and education revisited: implications for categorizing persons' educational status. *Am J Public Health.* 1996;86:1582-89.
40. Nelson DE, Mowery P, Tomar S, Marcus S, Giovino G, Zhao L. Trends in smokeless tobacco use among adults and adolescents in the United States. *Am J Public Health.* 2006;96:897-905.
41. Martin GC, Brown JP, Eifler CW, Houston GD. Oral leukoplakia status six weeks after cessation of smokeless tobacco use. *J Am Dent Assoc,* 1999; 945-954.
42. Haddock CK, Parker LC, Taylor JE, Poston WSC, Lando H, Talcott GW. An analysis of messages about tobacco in military installation newspapers. *Am J Public Health.* 2005;95:1458-63.

Table 1

Smokeless Tobacco Study Participants by Branch of Military Service (N = 785)

Branch of Military	Number of Military Installations	Number of Clinics	Number of Participants	Percentage of Participants by Branch of Service
Air Force	12	15	515	65.6
Army	6	11	237	30.2
Marines/Navy	2	2	33	4.2
Total	20	28	785	100.0

Table 2

Demographics of Smokeless Tobacco Users

	Mean or Number	Percentage or sd
Age	30.40	7.63
Gender		
Male	784	99.9%
Female	1	0.1%
Married	536	68.3%
Some College or Higher Education	618	78.7%
Ethnicity		
Hispanic or Latino	31	4.0%
Race		
White	699	89.0%
Black/African American	15	1.9%
American Indian	12	1.5%
Asian	9	1.1%
Military Grade		
Enlisted	681	86.8%
Officer	104	13.2%

Table 3

Characteristics of Smokeless Tobacco Use in Military Personnel

	Mean or Percentage	Standard Deviation
Number of days dip or chew per week	6.21	1.47
Number of days a tin or pouch lasts	3.7	2.16
Number of years of smokeless tobacco use	12.8	8.39
Age of initiation	17.7	5.11
Readiness to quit (0-10 on Contemplation Ladder)	6.43	12.54
Time of first use < 30 minutes after waking	23.9%	N/A
Percentage who swallow spit	49.9%	N/A
Percentage who currently smoke	20.0%	N/A
Percentage who attempted to quit in past year	45.9%	N/A

Table 4

Comparison of Air Force and Army Personnel on Demographics and ST Use

	Air Force (n = 515)	Army (n = 232)	Significance Test	p Value
Age	29.69	32.53	$t(723) = 4.60$	$p < .001$
Percent Married	70.7%	77.7%	$X^2(1, n = 710) = 4.70$	$p = .10$
Some College or Higher Education	82.2%	85.4%	$X^2(1, n = 721) = 1.10$	$p = .29$
Number of days dip or chew per week	6.24	6.20	$t(740) = .44$	$p = .26$
Number of days a tin or pouch lasts	3.80	3.40	$t(739) = 2.37$	$p < .05$
Number of years of smokeless tobacco use	12.30	14.40	$t(717) = 3.14$	$p < .01$
Age of initiation	17.41	18.09	$t(379) = 1.53$	$p = .13$
Readiness to quit (0-10 on Contemplation Ladder)	7.20	6.73	$t(739) = 2.63$	$p = .009$
Time of first use < 30 minutes after waking	20.7%	31.9%	$X^2(1, n = 744) = 10.91$	$p = .001$
Percentage who swallow spit	48.7%	54.3%	$X^2(1, n = 743) = 1.99$	$p = .158$
Percentage who currently smoke	19.3%	23.8%	$X^2(1, n = 725) = 1.93$	$p = .164$
Percentage who attempted to quit in past year	43.6%	47.4%	$X^2(1, n = 743) = .95$	$p = .331$
Body Mass Index	26.41	27.32	$t(721) = 3.57$	$p < .001$

Table 5

Comparison of Officer and Enlisted Personnel on Demographics and ST Use

	Officers (n = 104)	Enlisted (n = 681)	Significance Test	p Value
Age	34.71	29.74	t (756) = 6.21	p < .001
Percent Married	84.2%	70.5%	X ² (1, n = 742) = 7.89	p < .01
Some College or Higher Education	100%	79.1%	X ² (1, n = 754) = 25.30	p < .001
Number of days dip or chew per week	6.16	6.22	t (773) = .38	p = .701
Number of days a tin or pouch lasts	4.04	3.64	t (772) = 1.73	p = .084
Number of years of smokeless tobacco use	15.33	12.41	t (750) = 3.26	p < .001
Age of initiation	19.4	17.3	t (776) = 3.83	p < .001
Readiness to quit (0-10 on Contemplation Ladder)	7.1	6.3	t (739) = 3.26	p < .01
Time of first use < 30 minutes after waking	17.5%	24.9%	X ² (1, n = 746) = 2.72	p = .10
Percentage who swallow spit	41.3%	51.2%	X ² (1, n = 775) = 3.49	p = .062
Percentage who currently smoke	7.0%	22.8%	X ² (1, n = 757) = 13.19	p < .001
Percentage who attempted to quit in past year	56.9%	44.3%	X ² (1, n = 774) = 5.65	p < .05
Body Mass Index	26.82	26.62	t (754) = .58	p = .564

